

Distributed Generation Improvements in Industrial Applications

Contract 4000005689

Project Task 1 Review

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CSGI, Inc.

**RESOURCE
DYNAMICS
CORPORATION**

Presentation Outline

- **Background of the joint DOE/Industrial Center program**
- **Task 1 “Replicable Market Application Assessment”**
 - **Description**
 - **Analysis Method**
 - **Key Results**

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DG Improvements in Industrial Applications

- A joint program between DOE DER and the Industrial Center DG Consortium
- DOE DER Program Mgr.: Ms. Merrill Smith
- ORNL Project Manager: Ms. Patti Garland

Industrial Center DG Consortium Membership Statistics

- **Members:** *Fourteen utilities*
- **Champions:** *Henry Mak, SoCal Gas
Bob Scott, NiSource*
- **Technology Lead:** *Bob Fegan, MichCon
Interconnect Standards*
- **Center Coord.:** *Richard Biljetina*

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DG CONSORTIUM MEMBER COMPANIES

Dominion Energy

Enbridge Consumers Gas

Exelon Corp. (PECO)

KeySpan Energy

Michigan Consolidated Gas

National Fuel Gas Distr.

NG Technologie Centre

NiSource Inc.

NW Natural

Southern Natural Gas

Southern California Gas Co.

TXU Electric and Gas

Wisconsin Gas Co.

Yankee Gas Services Co.

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Overall Joint Program Objective

To accelerate the market acceptance of DG technologies by industrial and institutional customers.

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Joint Program Tasks

- Task 1. Market Application Assessments
Currently Funded
- Task 2. Integrated System Packaging
- Task 3. Innovative Demonstrations
- Task 4. Market Transformation

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Task 1. Replicable Market Application Assessment

Summary Report



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Specific Objective of Task 1

- Identify leading opportunities for integrated distributed generation (DG/CHP) packages
 - in industrial process applications
 - integrated with industrial process energy needs
 - that are innovative and replicable
- Assess/quantify economics and potential market

GOAL: Significant energy savings and efficiency improvement

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Task 1. Subtasks

- 1.1- Identify industries where replicable integrated DG packages could be applied.
- 1.2- Provide innovative package applications from selected integrated DG systems.
- 1.3- Complete economic analysis for the selected integrated DG package opportunities.
- 1.4- Provide a market assessment of the selected technologies with an estimate of economic returns.
- 1.5- Reporting

Task 1 Status

- **Technical support by Resource Dynamics Corporation and CSGI**
- **All work has been completed on time and within budget**
- **Market Assessment completed June 2001**

Task 1. Replicable Market Application Assessment

Analysis Method



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Task 1 Analysis Method

- Prepared four digit SIC (20 to 39) process matrix
- Selected engine and microturbine/turbine DG systems and identified pool of leading process opportunities
- Screened for “Top 5” opportunities based on energy consumption

Task 1 Analysis Method (cont.)

- **Defined cost and performance parameters for the top 5 systems**
- **Determined industrial thermal requirements, by 4 digit SIC, for each of the top 5 opportunities**
- **Developed integrated DG cogeneration systems that encompass these thermal processes**

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Task 1 Analysis Method (cont.)

- **Modified and used the RDC DISPERSE software program to model the cogeneration systems**
- **Assessed the potential market for these systems by comparing their economics with the economics of conventional solutions**

Task 1. Replicable Market Application Assessment

Key Results



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Top 5 Industrial CHP Systems

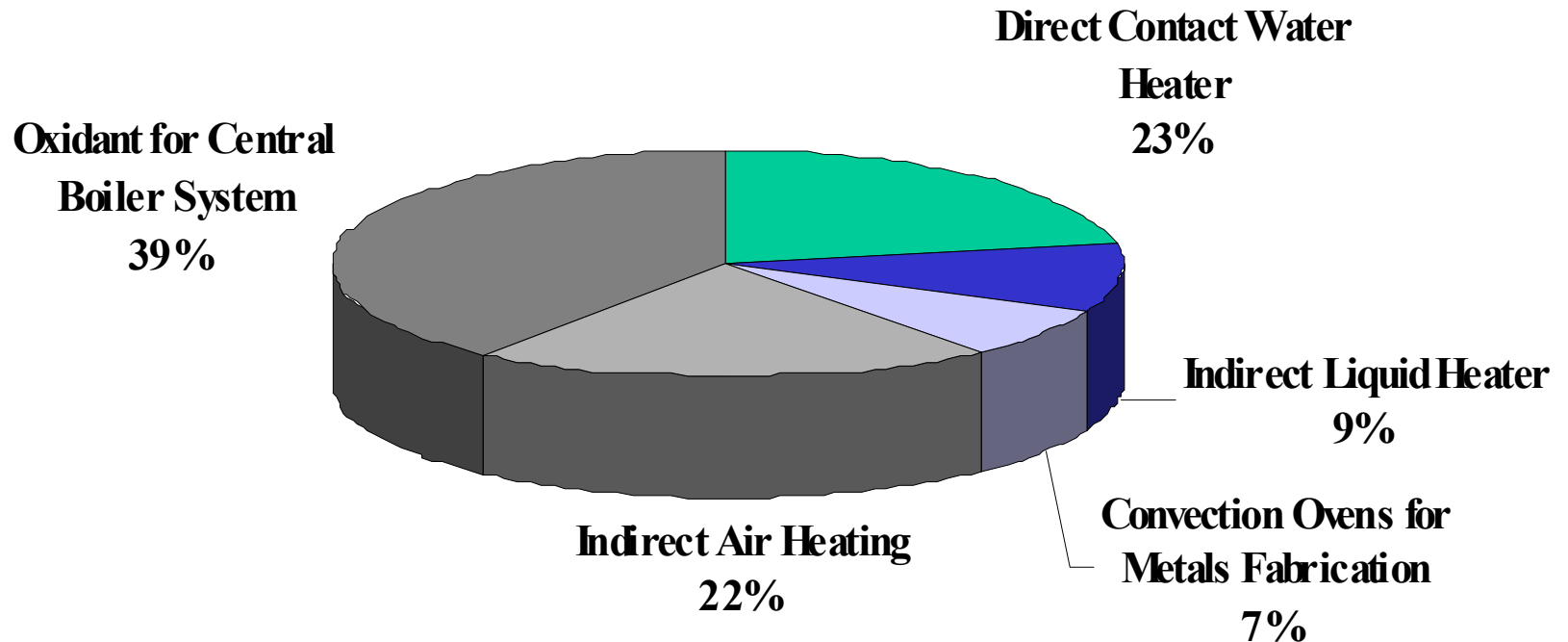
- Direct contact water heaters fed directly with engine/turbine exhaust
- Indirect liquid heating using air-to-liquid heat exchangers fed with engine/turbine exhaust
- Direct process heating with engine/turbine exhaust
- Indirect air heating using air-to-air heat exchangers fed with engine/turbine exhaust
- Central boiler systems using turbine exhaust gas as a combustion oxidant

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Results by System Type

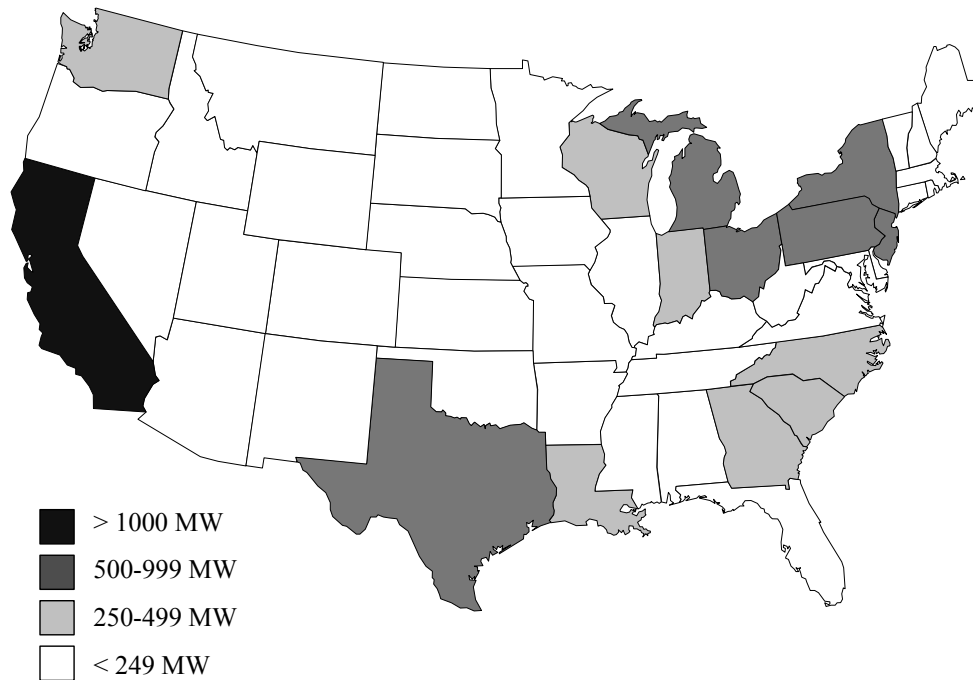
10.8 GW Total Economic Potential for Units up to 1MW



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Results by State (10.8 GW total)



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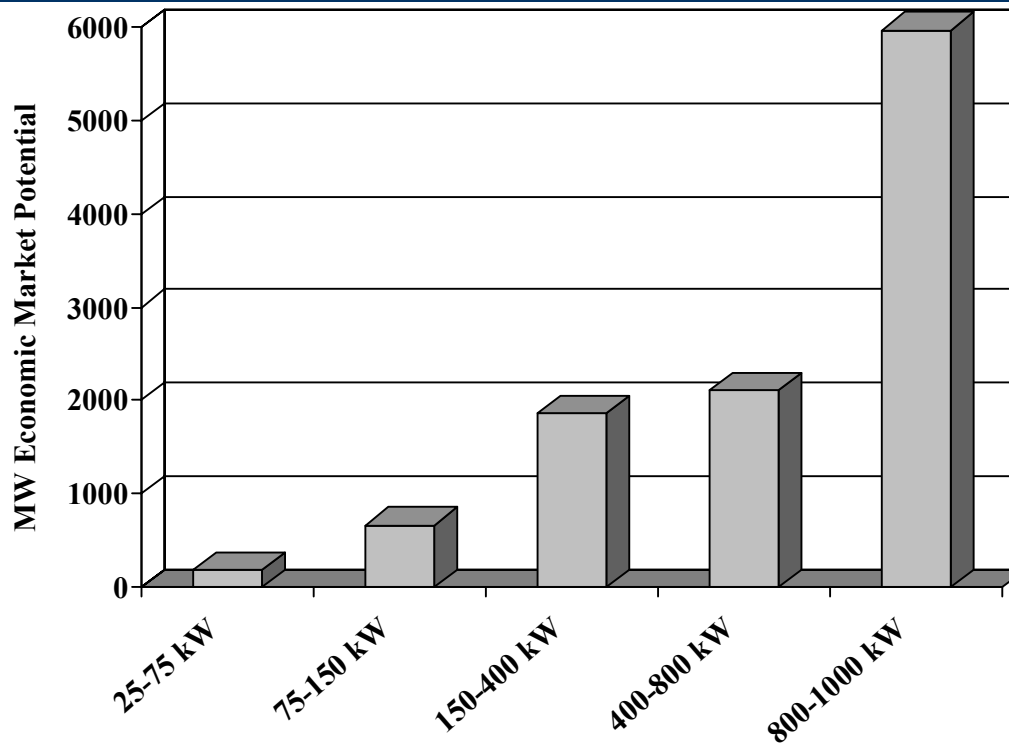
Factors Influencing Market Potential by State

- Number of industrial facilities
- Natural gas and electricity rates

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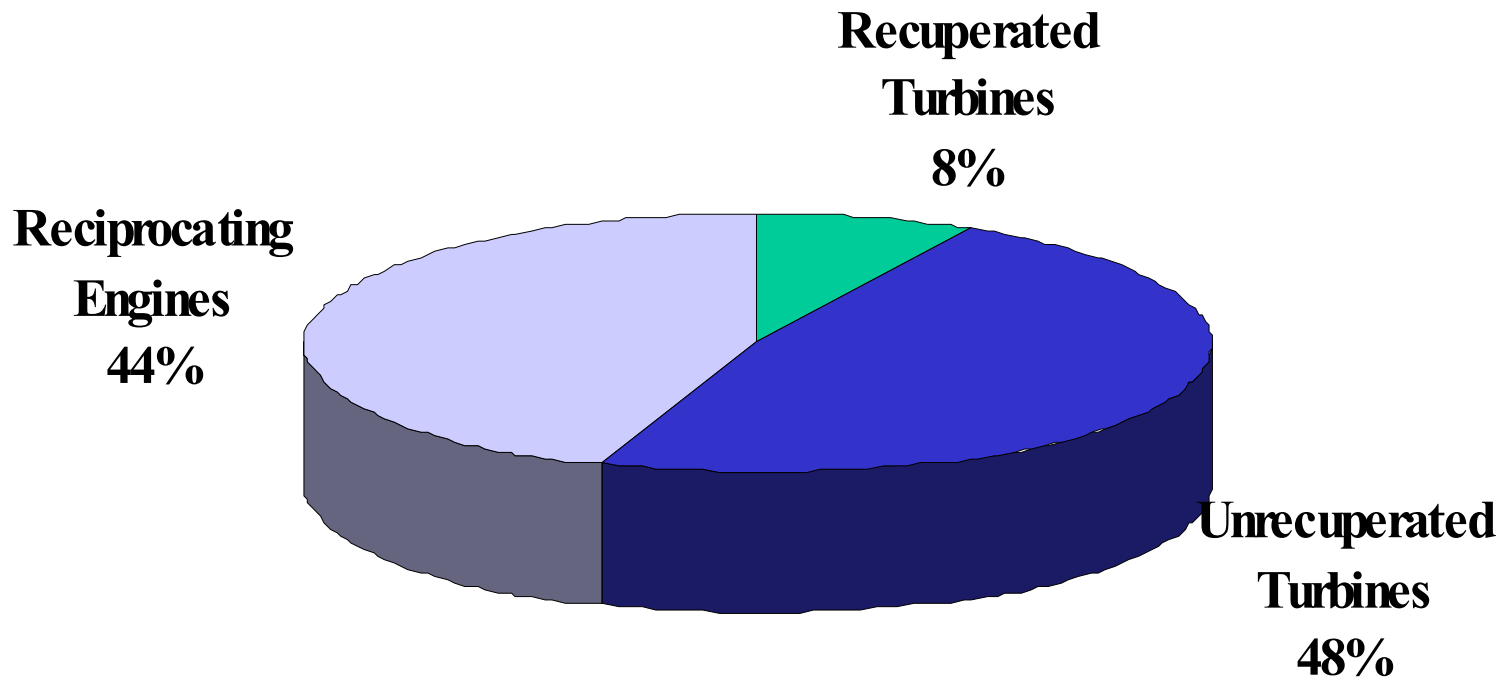
Results by Size Range



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Results by Prime Mover Type



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What's next?



Demonstrations provide

- case histories
- applications manual



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Appendix

- **Industrial Center Description**
- **Task 1 Work Flow**
- **Task 1 Schedule**

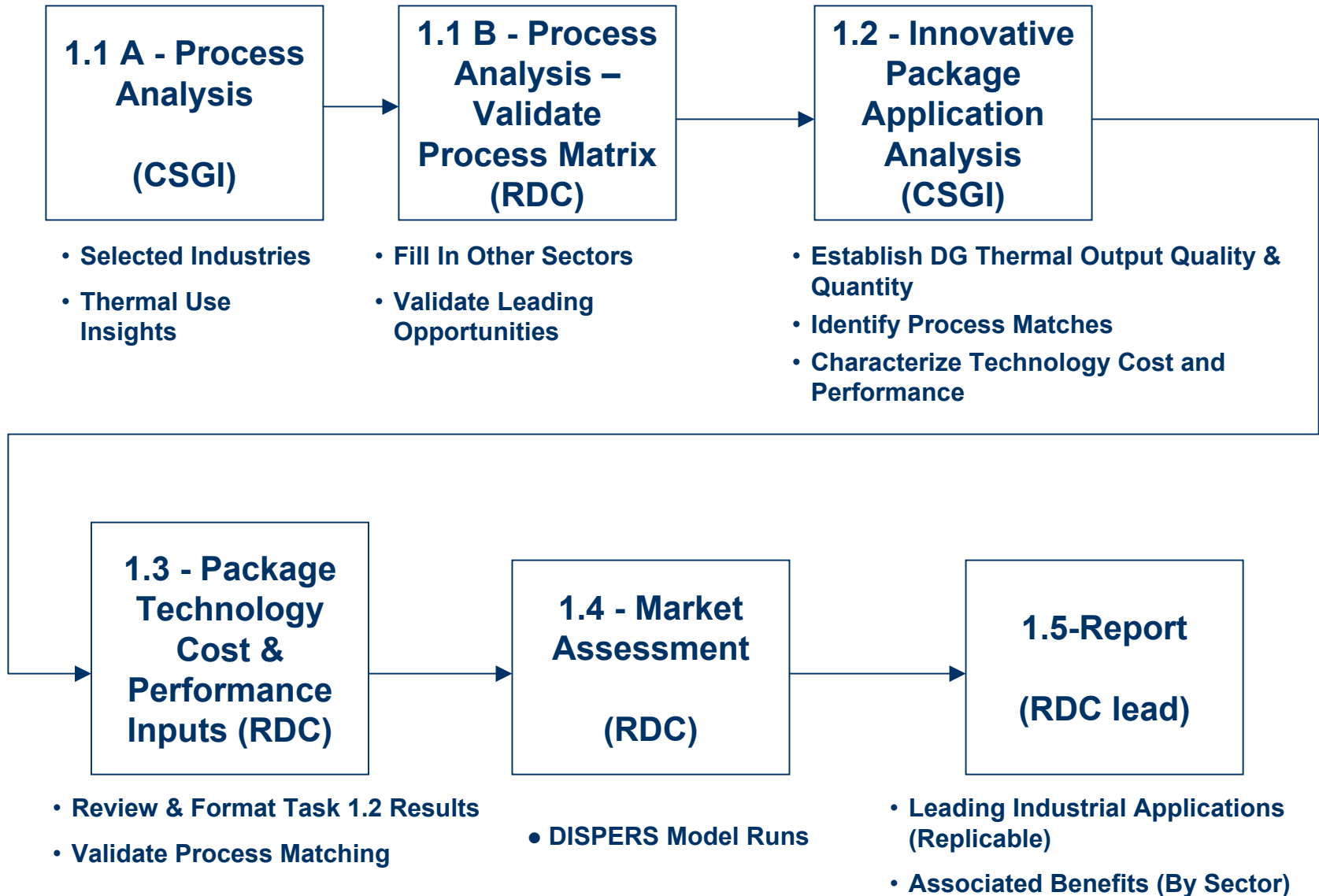
Industrial Center

- Technology commercialization & market development organization
- Established in 1991 (spin-off from AGA)
- 501(c)6 trade association of 28 companies
- Located in Washington, DC
- Executive Director: David Weiss
- Consortium approach to products and services
- More details at www.industrialcenter.org

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Task 1 Work Flow - Application Analysis



Task 1 Schedule

	Task	Resp	2000			2001																	
			Dec	Jan			Feb			Mar			Apr			May			Jun				
1.1A	Indus Matrix-Key Processes	CSGI																					
1.1B	Validate/Expand Matrix	RDC																					
1.2	Package Applic Analysis	CSGI																					
1.3	Cost/Technol Inputs	RDC																					
1.4	Market Assessment	RDC																					
1.5	Final Report	RDC																					
	Milestones																						
	Project Planning Meeting		◆																				
	DOE Kickoff Meeting			◆																			
	Project Review Meeting				◆													◆					
			Revised January 25, 2001																				